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Detection and quantification of *Flavobacterium psychrophilum* specific bacteriophages in rainbow trout upon different administration methods: Implications for disease control in aquaculture

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Flavobacterium psychrophilum is the pathogen causing the disease rainbow trout fry syndrome (RTFS), which has important implications for aquaculture production and trade worldwide. RTFS can be treated by antibiotic administration, but with the increasing problem of antibiotic resistant bacteria, the use of lytic bacteriophages is a promising alternative approach to disease control in aquaculture.

Bacteriophage control of bacterial infections depends on efficient delivery of the phages to the infected organs, and in this study we therefore examined the occurrence and persistence of phages in the internal organs in rainbow trout, following different administration methods. Three phage administration methods using phage FpV-9 were used: phage bath, oral administration of phage-suspension directly into the stomach and feeding with phage-coated feed pellets.

Phages were detected in all the four examined organs (intestine, brain, spleen and liver) with all three administration methods, demonstrating that the phages are capable of passing the intestinal wall and entering the bloodstream. The highest phage concentration was found in the intestine where a maximum of $3x10^{10}$ phages g^{-1} was obtained after oral administration of phage-suspension, but also phage addition via phage-coated feed pellets resulted in high phage titers ($5x10^{6}$ phages g^{-1} intestine). The concentration of phages in the spleen was 100 fold lower than in the intestine, suggesting a large phage decay during transport to the inner organs. These results provide the basis for future phage treatment of RTFS.

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